

STAMINA.

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The object of this essay is to reduce the signification of the words "susceptibility," "predisposition" and "heredity."

In the progress of bacteriological knowledge, there is too little attention paid to the organic conditions of health, and the resisting power of the system in conflict with antagonistic forces. Thirty years ago, while engaged in the study of "Living Things," the writer had occasion to observe: "Man's life is inseparably linked with the plants and animals which coexist with him, and these are the issue of long anticipations and preparations, where all the changes produced in other objects occur according to a relation existing among the substances changed. Latitude, elevation, nature of the soil, degree of cultivation, relative position in regard to mountains, forests, rivers, etc., and general aspect of the neighborhood, all modify the condition of man, and prove his adaptability by such effects as serve to make him understand his relations to what is around him. We cannot prevent the dews of heaven, nor the heat of the sun, nor the progress of decomposition; but we can understand the course and order of natural phenomena, we can trace out the laws that govern them and ascertain our relations to them."

The reward of man's cosmopolitan nature and free agency is the progress of human welfare, even though won at the cost of impaired health and premature death by those who do the most to promote it. But the influence is reciprocal. Man reacts upon nature no less than nature upon him. Indeed, the changes effected in natural phenomena by human agency are the striking characteristics of conditions promotive of, or in conflict with human health everywhere. This reciprocal action should, above all things else, make the progressive man alive to the importance of constructing and sustaining his ability to contend against the antagonistic forces—both natural and artificial—with which his sphere of life is everywhere intimately associated. And in the application of this knowledge he will learn that health is something more than mere freedom from disease. Health is *opposed* to disease and its causes by the relative integrity, strength and vigor of all the organs and functions of the body, fortified by such conditions as the human organism depends upon for its fabrication and resistance. For example: Two individuals, the one endeavoring to live by rule, and having much to say about the "laws of health," afraid to run

upstairs because it makes the heart beat more rapidly, hurries the respiration and fills the lungs; can't eat cheese because it constipates the bowels, nor cherries for the contrary reason; never drinks water, or but very little, with meals; can't take a glass of milk at bedtime, or a hot roll for breakfast, because such food always sets heavy on the stomach; never eats bacon or pork, and eschews fat meat of all kinds; takes an hour at meals and always leaves off hungry; would not take a cold bath for anything; who prefers the weight of a thick furlined overcoat or cloak to a light one and a brisk walk on a cold day; and sundry other postulates promotive of tenderness. And the other—the reverse: Who is neither afraid to hurry at his meals or to his business; not only runs up stairs, but a long hill, or if in a hurry, forty rods or more after a railroad car; who has taught his stomach, as he has his arms, legs, heart and lungs such lessons in gymnastics as not to be too dainty, and to profit by the variation; who satisfies hunger and thirst; when among Romans, live as they do; finds hog, hominy and hot bread digestible, wholesome and nutritious; has, in short, never tried to live by any rule, except temperance in all things and protection against the extremes of weather. Both of such persons may be equally free from disease, but is it necessary to add that the power of the latter to resist it in every respect—whether it be inhaled, swallowed, inherited, or by exposure to inclement weather—is greatly in favor of the well-nourished and the strong? And the relative immunity depends not upon predisposition, but upon stamina.

With regard to certain infectious diseases to which children are especially liable, in part, doubtless, because of their greater functional activity, but chiefly because their power of resistance has not yet become sufficiently fortified—for it is well known that adults generally who have not encountered those diseases in childhood rarely contract them subsequently—the same relative immunity exists; the strong and vigorous child is much less likely to contract them than the feeble; and the convalescent, those who are particularly feeble from any one of such diseases, are well known to be the most of all liable to attack and to succumb from another. And of pulmonary consumption, the most prevalent and the most fatal of all diseases, who does not know that enfeeblement invites it? That individuals are less and less liable to it—whether traceable to hereditary taint or otherwise—in proportion as coddling has been avoided, appetite for wholesome fat food cultivated, cold bathing habitual, protective but loose clothing worn, and exercise in the open air unrestrained? By the maintenance of these conditions all the processes of healthy organization are promoted and the constitution fortified against tubercle bacilli as in

¹ "Knowledge of Living Things with the Laws of their Existence," by A. N. Bell, A.M., M.D. Bailliere Brothers, New York, 1860.

like manner against other disease germs, no matter whence the quarter or at whatever age of the individual exposed; and no less against diseases not attributable to germs. And the more if we accept Metschnikoff's theory of the office of the *leucocytes* or white blood corpuscles, for these in both number and strength depend upon proper nourishment. "In health," says Kirkes, "the proportion of white to red corpuscles, which, taking an average is about 1 to 500 or 600, varies considerably, even in the course of the same day. The variations appear to depend chiefly on the amount and probably also on the kind of food taken, the number of leucocytes being very considerably increased by a meal, and diminished again on fasting. Also in young persons, during pregnancy, and after great loss of blood, there is a larger proportion of colorless blood corpuscles, which probably shows that they are more rapidly formed under these circumstances. In old age, on the other hand, their proportion is diminished."²

No good observer will fail to recognize the coincidence of the condition which diminishes the proportion of leucocytes and the increased liability to disease—that of fasting; or note the no less remarkable coincidence, the diminution in the number of the leucocytes and increasing infirmity of old age. The leucocyte or colorless blood corpuscle is an *amœba*, the simplest type of a living thing; a jelly-like mass of protoplasm, of the same consistence throughout, which possesses the property of moving about and capturing its prey by changing its form by the protrusion of first one part of its body and then another, and of extemporizing a stomach by wrapping itself around any nutritive particle with which it comes in contact and digesting it. On account of this peculiar property and apparent function of the leucocytes Metschnikoff has conferred upon them the name of *phagocytes*—eaters—as expressive of their most distinctive feature, and of the process in general, *phagocytosis*.

"It has long been known," says Dr. William Osler,³ "that foreign bodies such as ligatures, portions of dead bone and other substances, may be completely removed by leucocytes.

"Nowhere in the body do we have such a facility for studying the action of phagocytes as in the organs of respiration, in which, with the cilia of the bronchial mucosa, they share in the work of cleansing the air-passages; and of these two important agencies it is hard to say which plays the more important part in the expulsion of those particles of foreign matter which, in cities at least, we constantly inhale. There are several groups of cells engaged in this work: The ordinary mucus corpuscles; the alveolar epithelium;

the connective tissue-elements of the pulmonary stroma, and the leucocytes of the lymph tissue in the bronchial, tracheal, mediastinal glands.

"The examination of the morning sputa of a cigarette smoker, or of a person who has been exposed to a dusty atmosphere, shows very clearly that no small proportion of the carbon grains is included within protoplasm. The free granules are abundant, but almost every leucocyte has its little load which it has picked up on its road from the finer tubes to the trachea.

"It is possible to conceive, under certain conditions, of the air cells gradually filling, were it not for the activity of phagocytes, derived largely from the alveolar epithelium, which stands, as it were, at the gateway of the lymphatic circulation.

"In dwellers in the country, as well as in wild animals, breathing an air comparatively pure, the cilia and the phagocytes in the air-passages appear quite able to prevent access of the carbon grains to the lung tissue; whereas in the dwellers in the cities, and in animals kept in confinement, the impurities in the air are so abundant that these agents are insufficient, and sooner or later the grains penetrate the air cells.

"The steps in this process described may be followed in the lungs of any town dweller, but to see in perfection the remarkable activity of the pulmonary phagocytes, one must study the early stages of anthracosis, particularly in those exceptional cases which we see occasionally when a miner has been killed by accident or dies of acute disease. It is not, I think, too much to say that the larger part of the pigment contained in lungs, almost, if not quite, black, is enclosed in protoplasmic cells.

"A physiological process in which phagocytes play a leading rôle, is the removal and disintegration of the red blood corpuscles which have lived their life and are no longer fit for work. The cells containing the red blood-corpuscles, which are found in the bone marrow and in the spleen, however much opinion may differ as to their mode of origin, cannot, I think, be regarded in any other light than as phagocytic elements with this definite function.

"In the mature body we have seen that in the lungs, in the intestines, and in the blood-making organs, the phagocytes have most essential functions; but the question of chief interest to-day relates, not so much to this normal process about which there has never been much doubt, as to the supposed part which these cells take in protecting the body against the invasion of parasites.

"Metschnikoff has studied a number of diseases, erysipelas, anthrax, relapsing fever, and tuberculosis, with a view of finding facts in support of this theory, and his communications within the past four years have been numerous and elaborate.⁴

² Kirke's Hand Book of Physiology, vol. 1, page 79.

³ Address before the Alumni Association of Bellevue Hospital, New York, April 3, 1889.

⁴ Published chiefly in Virchow's Archiv.

"In erysipelas the cocci are attacked first by the leucocytes filling the lymph spaces, which rapidly proliferate and actively eat the microorganisms. Not alone do the colorless corpuscles act as phagocytes, but the fixed connective tissue cells assist in an important manner. In cases of recovery he found that behind the advancing cocci the leucocytes were crowded with parasites, which showed evidences of digestion and destruction. The connective tissue cells do not appear to attack the cocci, but are chiefly concerned with the absorption of the inflammatory exudate, even taking up the leucocytes which have died. In fatal cases there was enormous development of micrococci, the majority of which lay free in the tissues not enclosed in the phagocytes.

"As we might suppose, the views of Metschnikoff have met with sharp criticism in many quarters, and from no one more ably and at greater length than from Baumgarten.⁵ While not denying that the leucocytes eat the bacteria, he claims that the process is by no means universal, and is carried on so unequally, that we can scarcely speak of an active warfare waged against the parasites.

"Metschnikoff states that in malaria the parasites are attacked chiefly in the spleen and the liver by the larger phagocytes existing in these organs, and to a much less extent by the leucocytes in the circulating blood.

"We see then, in malaria very little evidence in the blood favoring a theory of phagocytosis; certainly no such campaigning on the part of the leucocytes as might be expected from the presence, in such numbers, of foes so destructive to the red corpuscles."

Dr. Osler concludes that: "While phagocytosis is a wide-spread and important physiological process throughout the animal kingdom, and while it undoubtedly plays a most important part in many pathological conditions, the question of an active destructive warfare waged by the body cells against the microorganisms of disease must still be considered an open one." (*Medical News.*)

Whatever may be the final verdict with regard to the antagonism of the phagocytes to disease germs generally, it appears to be clear that their proportion and their energy are in direct relation with the vigor of the organism, and dependent upon the same sustaining conditions.

Sir Wm. R. Grove, F.R.S., the distinguished author of "Antagonism," (the subject of a lecture delivered at the Royal Institution of Great Britain, April 20, 1888,) after alluding to Prof. Metschnikoff's theory, says:

"Let us now consider the external life of animals. I will take as an instance, for a reason which you will soon see, the life of a wild rabbit. It is throughout its life, except when asleep (of

which more presently), using exertion, cropping grass, at war with vegetables, etc. If it gets a luxurious pasture it dies of repletion. If it gets too little it dies of inanition. To keep itself healthy it must exert itself for its food; this, and perhaps the avoiding its enemies, gives it exercise and care, brings all its organs into use, and thus it acquires its most perfect form of life. I have witnessed this effect myself, and that is the reason why I choose the rabbit as an example. An estate in Somersetshire, which I once took temporarily, was on the slope of the Mendip Hills. The rabbits on one part of it, viz., that on the hillside, were in perfect condition, not too fat nor too thin, sleek, active and vigorous, and yielding to their antagonists, myself and family, excellent food. Those in the valley, where the pasturage was rich and luxuriant, were all diseased, most of them unfit for human food, and many lying dead on the fields. They had not to struggle for life, their short life was miserable, and their death early; they wanted the sweet uses of adversity—that is, of antagonism.

"The same story may be told of other animals. Carnivora, beasts or birds of prey, live on weaker animals; weaker animals herd together to resist, or, by better chance of warning, to escape beasts of prey; while they, the herbivora, in their turn are destroying vegetable organisms.

"I now come to the most delicate part of my subject, viz., man (I include women of course). Is man exempt from this continual struggle?

"It is needless to say that war is antagonism. Is not peace so also, though in a different form? It is a commonplace remark to say that the idle man is worn out by ennui, *i. e.*, by internal antagonism. Kingsley's "Do-as-you-like" race—who were fed by a substance dropping from trees, who did no work, and who gradually degenerated until they became inferior to apes, and ultimately died out from having nothing to do, nothing to struggle with—is a caricature illustrative of the matter.

"As, with food or exercise, deficiency is as injurious in one as is excess in another direction, so, as affecting the mind of communities, as I have stated it to be with individuals, the effect of a life of ease and too much repose is as much to be avoided as a life of unremitting toil. The Pitcairn Islanders, who managed in some way to adapt their wants to their supply, and to avoid undue increase of population, are said never to have reached old age. In consequence of the uneventful, unexcited lives they led, they died of inaction, not from deficiency of food or shelter, but of excitement. They should have migrated to England! They died as hares do when their ears are stuffed with cotton, *i. e.*, from want of anxiety. We have hope in our suffering, and in the mid-gush of our pleasures something bitter surges up."

⁵I, *oc. cit.*

"We look before and after,
And pine for what is not;
Our sincerest laughter
With some pain is fraught;
Our sweetest songs are those which tell of
Saddest thought."

(*Nature.*)

With reference to heredity especially (as too commonly understood), in the face of what has been brought forward, while it has undoubtedly significance with reference to certain constitutional diseases, it is, notwithstanding, amenable to the same organic forces as feebleness of constitution in general; dependent more upon parental feebleness and unhealthful regimen in early life than upon specific tendency. The offspring of poorly nourished, dyspeptic parents, for illustration, are scarcely less liable to pulmonary consumption than the offspring of those affected with that disease; and the offspring of drunkards and of those who use narcotics to excess are well known to be fully as liable to insanity, epilepsy and idiocy as they are to inebriety. Indeed, hereditary feebleness of constitution is the prevailing "predisposition" to disease, and this, associated as it frequently is with inadequate nourishment and neglectful regimen during childhood, accounts in a great degree for the excessive mortality which obtains in infancy.

But in advocating more attention to personal regimen as the chief means of cultivating constitutional stamina and thus increasing the power of resistance to disease, which it is the purpose of this paper to urge, there should be no diversion from the effort to destroy the foci of disease germs and to maintain healthful surroundings. It should always be borne in mind, however, that the ability of the practical sanitarian to successfully cope with infectious disease-germs and their foci, and to maintain his own immunity, is the same as that of other persons: in proportion to the power of resistance, based upon constitutional and cherished stamina.

WHEN SHOULD THE OBSTETRIC FORCEPS BE USED? AND WHAT FORM OF INSTRUMENT IS REQUIRED?

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The question as to when the obstetric forceps should be used follows on the assumption that there are times when they are required. Taking for granted this necessity let us briefly refer to it, enumerating in the first place the circumstances and conditions which do *not* justify the application of the blades.

The forceps should never be used simply to

gratify nervous patients, interfering nurses or meddlesome women, nor to save the time of a practitioner, busy or otherwise. The possibility and comparative ease of applying the blades within the partially dilated os is no indication that even the most careful use in such cases may not result in the rupturing of the cervix and other soft parts, exposing the patient to the immediate dangers from hæmorrhage, septicæmia and the various inflammatory conditions, and as well the possibility of life-long suffering.

The indications for the use of the obstetric forceps may be enumerated as follows:

1. Where speedy delivery is necessary in the interest of either mother or child; as in eclampsia, hæmorrhage, exhaustion, prolapse of the cord, etc. 2. Where the ordinary forces of labor are insufficient to overcome the obstacles to delivery; as in narrowing or partial obstruction of the birth-canal within certain limits, uterine inertia, large foetal head, malpositions, and where the head is engaged in the pelvis and there has been no advance for some time, the "rebound" during the interval between the diminishing pains having ceased.

In addition it is of importance in all cases before applying the forceps to be assured of the existence of the following conditions: 1. That the membranes are ruptured. 2. That there is complete dilatation of the os and retraction of the cervix. 3. Knowledge of the position of the presenting part. 4. Emptiness of the bladder and bowel.

What form of Obstetric forceps should be employed?

The general answer is to use the form best adapted to, the case if possible. It must be admitted, however, that each practitioner has acquired by repeated experiences a certain degree of skill in the use of his choice of instrument, notwithstanding its imperfections. But it is not my purpose to refer to the list of instruments which have been more or less in use since the time of Chamberlen's invention, either by condemning one or extolling another, but rather to call your attention to some mathematical principles which should be taken into account in the construction of the obstetric forceps.

It is a trite, but no less true saying that "necessity is often the mother of invention"—with myself it has been the long felt necessity for certain unfulfilled requirements in the obstetric forceps in use that has led to investigations and experiments in this direction. My chief objection to the instruments in use has been the *crossing* of the handles, which, as we are all aware, necessitates the application of the right blade first in order that they may be locked. When the case is one of ordinary position of the head (first position, or left occipito-anterior) there is usually no difficulty in applying the blades in